United States Department
of Agriculture

White Woman Watershed

Hydrologic Unit Code 11030002

Natural Resources
Conservation Service

Rapid Assessment

Lakewood, Colorado

RWA 11030002

September 2008

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Introduction

Background Information

The Natural Resources Conservation Service (NRCS) is encouraging the development of rapid watershed assessments in order to increase the speed and efficiency generating information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers.

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

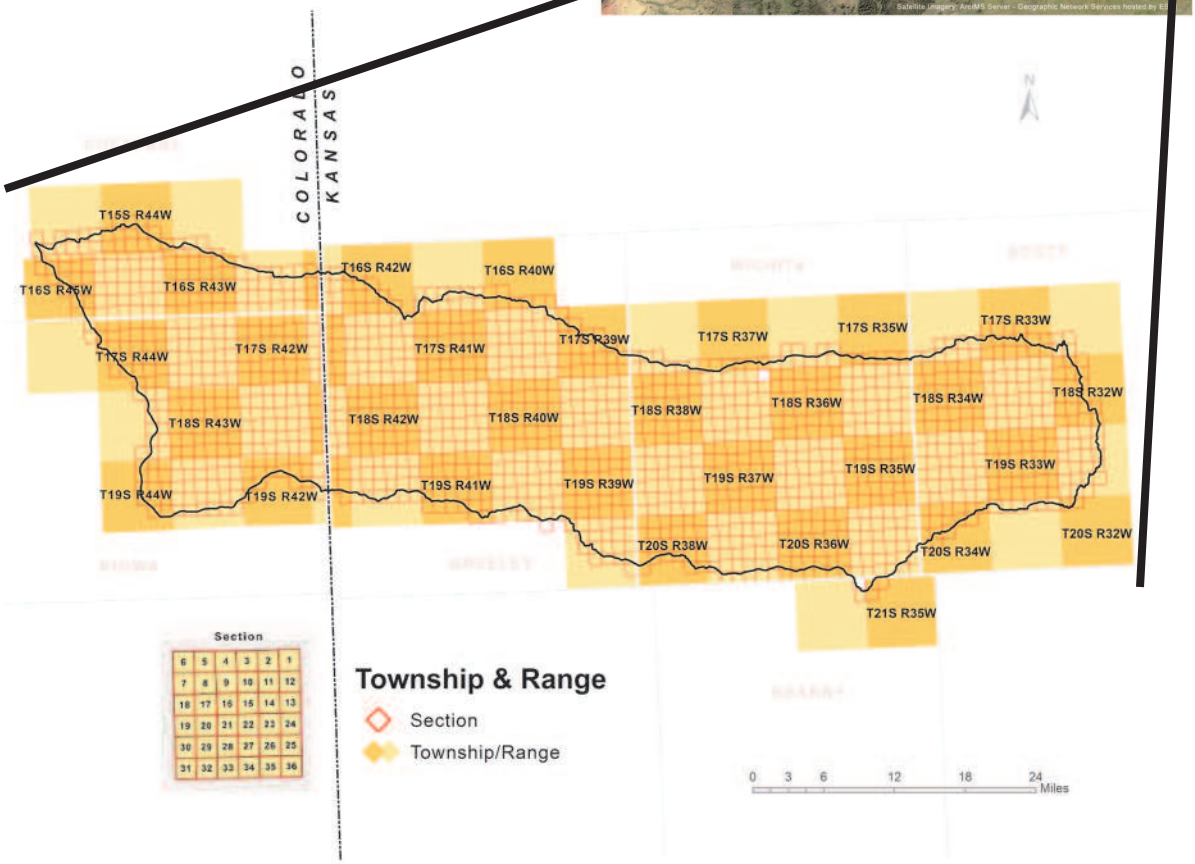
Benefits of these Activities

While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

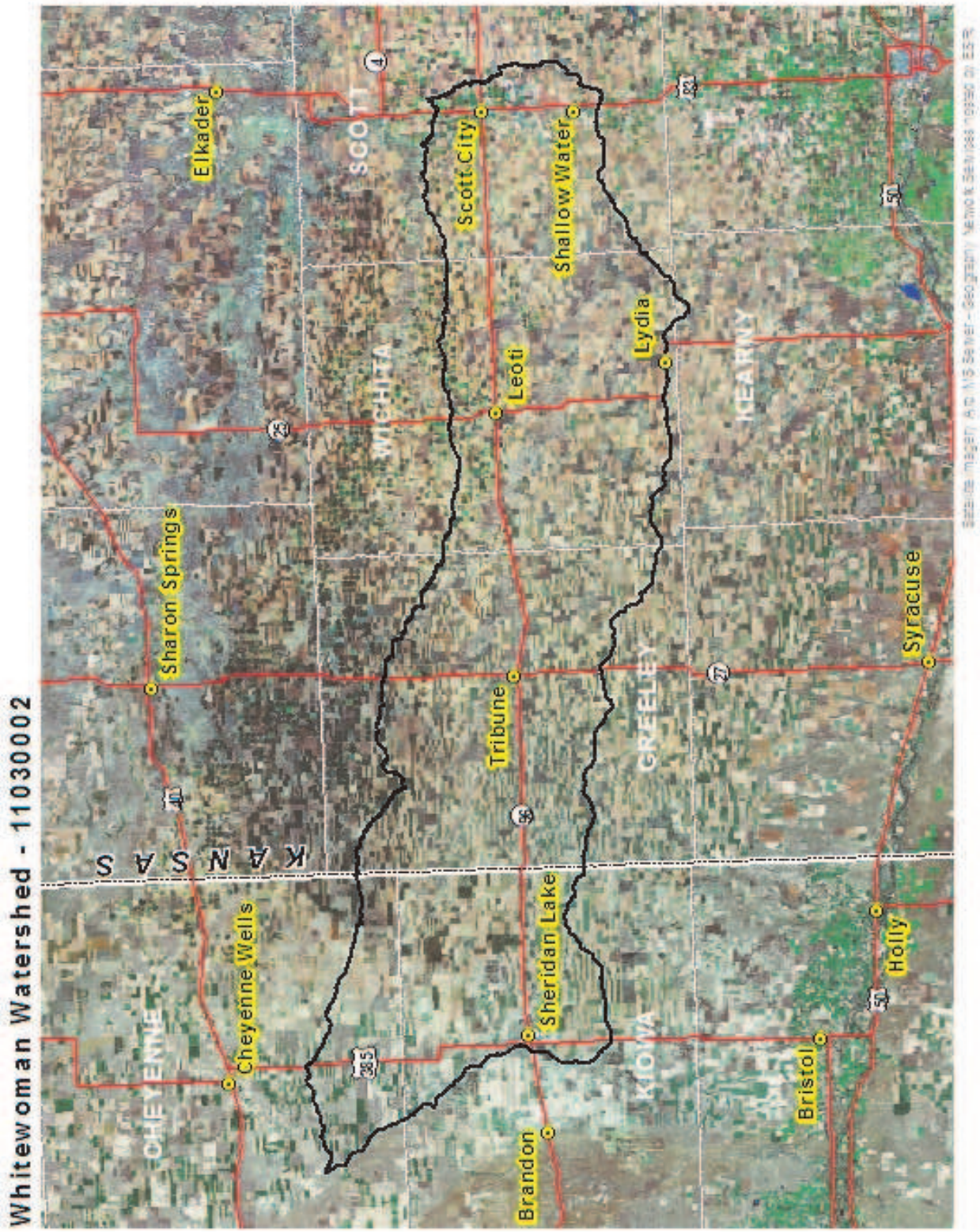
- Quick and inexpensive tools for setting priorities and taking action
- Providing a level of detail that is sufficient for identifying actions that can be taken with no further watershed-level studies or analyses
- Actions to be taken may require further Federal or State permits or ESA or NEPA analysis but these activities are part of standard requirements for use of best management practices (BMPs) and conservation systems
- Identifying where further detailed analyses or watershed studies are needed
- Plans address multiple objectives and concerns of landowners and communities
- Plans are based on established partnerships at the local and state levels
- Plans enable landowners and communities to decide on the best mix of NRCS programs that will meet their goals
- Plans include the full array of conservation program tools (i.e. cost-share practices, easements, technical assistance)

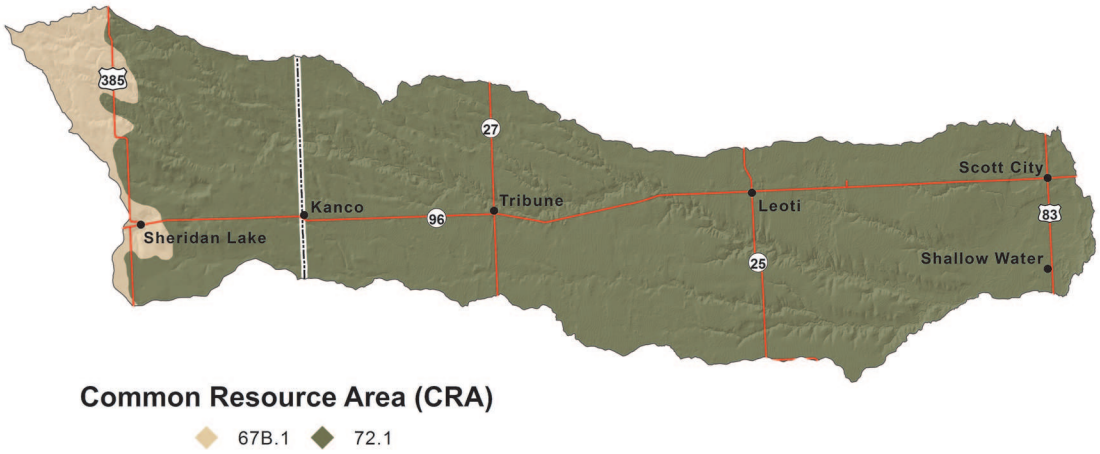
Rapid Watershed Assessments provide information that helps land-owners and local leaders set conservation priorities.

The White Woman Watershed is located in the Republican River Basin, on the eastern plains of Colorado. The watershed is 908,178 acres in size, with 174,322 acres in Colorado. Approximately 486 farms and ranches cover 803,369 acres in the entire watershed. As of April 2005, there are 77,987 acres of land in the Conservation Reserve Program.



COLORADO County	County Acres	County Acres in Whitewoman Watershed	% of County in the Watershed	% of Watershed in the County
Cheyenne	1,140,382	76,512	6.7%	8.2%
Kiowa	1,143,333	160,887	14.1%	17.2%
KANSAS				
Greeley	498,469	292,495	58.7%	31.3%
Kearny	558,744	911	0.2%	0.1%
Scott	460,360	134,514	29.2%	14.4%
Wichita	460,642	268,470	58.3%	28.8%
		933,789		


Whitewoman Watershed - 11030002
KANSAS
Elkader
Sharon Springs
Cheyenne Wells
Scott City
Leoti
Tribune
Sheridan Lake
Brandon
Shallow Water
Lydia
Syracuse
Holly
Bristol
SCOTT
WICHITA
GREELEY
KEARNY
KIOWA
CHEYENNE



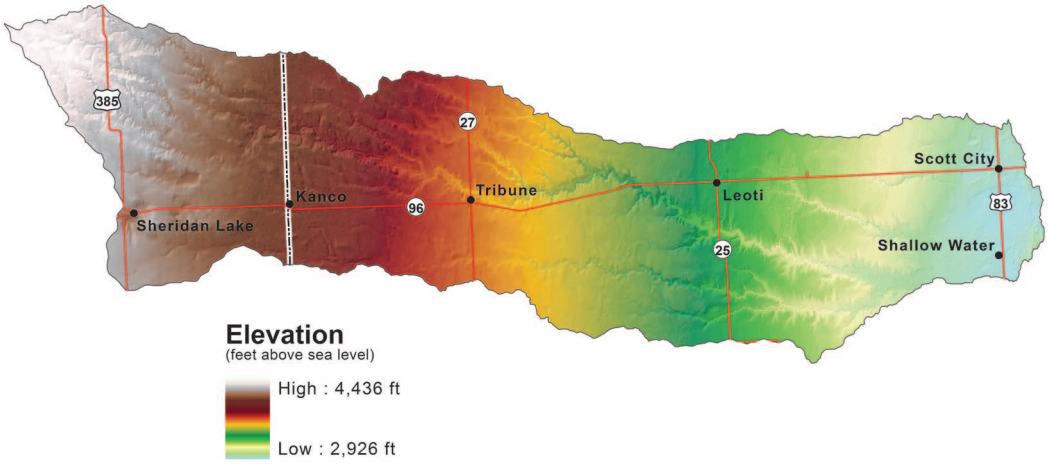
CRA: A geographical area where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

MLRA	CRA	CRA NAME	CRA DESCRIPTION
67B	**67B.1**	Central Great Plains, Southern Part	The Central High Plains, Southern Part CRA is broad, undulating to rolling plains dissected by streams and rivers. Local relief is measured in tens of feet on the plains. Soils are deep and formed in aeolian and alluvial materials. Pre-settlement vegetation was short grass prairies. Nearly all of this area in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
72	**72.1**	Central High Tableland	The Central High Tableland CRA is broad, level to gently rolling, loess mantled tableland. Local relief is measured in feet on the tableland tens of feet and major river valleys bordered by steep slopes. Soils are deep. Pre-settlement vegetation was short grass prairies. Nearly all of this area in cropland, both dry land small grain crops and irrigated corn and grain sorghum.

Physical Description

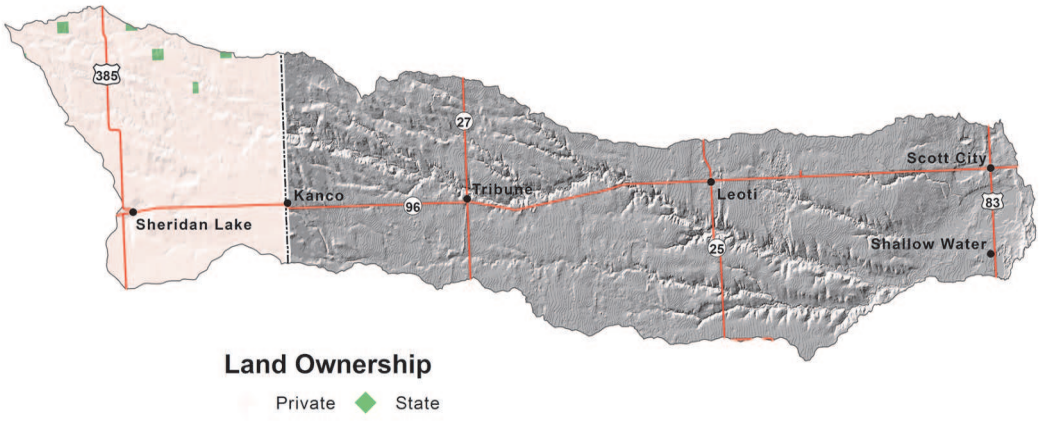
The White Woman watershed consists of broad, inter-valley remnants of smooth plain, with gently rolling slopes, punctuated by steeper slopes along the drainages.

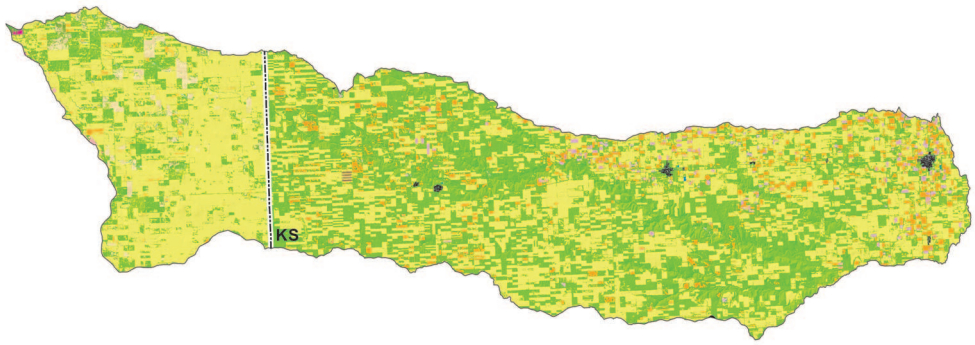
The predominant land use is agriculture, consisting of cash grain farming and livestock production. Cropland is dominated by dryland winter wheat rotations, and corn and grain sorghum production in areas where irrigation is available. Steeper slopes are generally in native grasses and used for livestock grazing.



Land Ownership

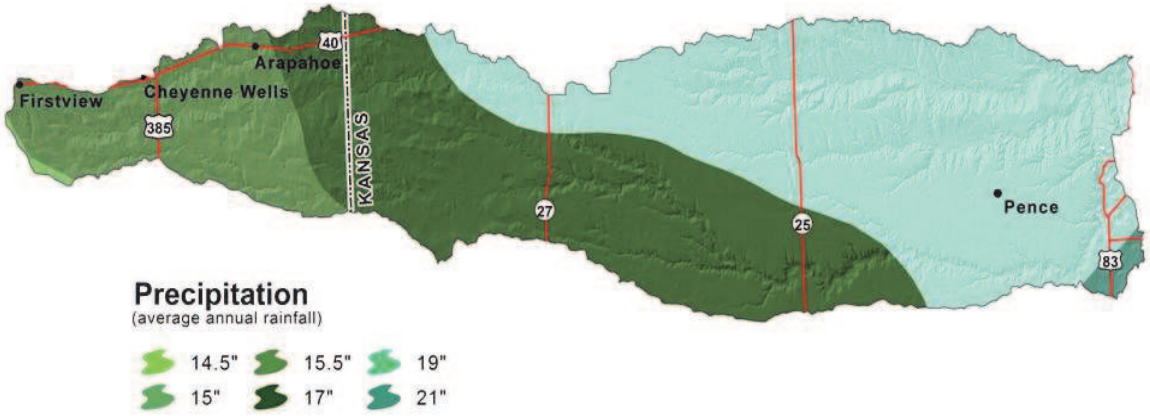
Approximately 235,119 acres in the White Woman Watershed are privately owned, and 2,311 acres are state controlled land.





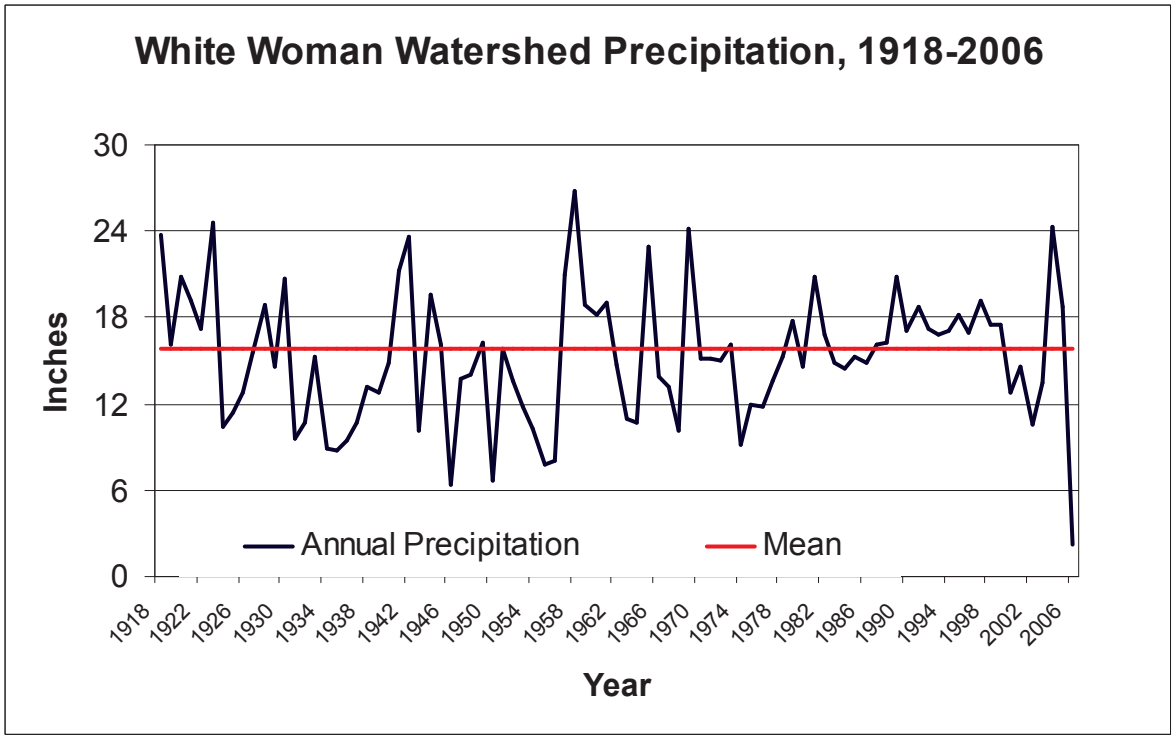
WHITEWOMAN Colorado Land Use	Total Acreage	Vegetation	Acreage
Cropland	169,180	Irrigated Ag	2,793.4
		Dryland Ag	166,379.7
		Agriculture Land	7.3
Rangeland/Grassland	66,827	Grass Dominated	48,980.1
		Grass/Forb Mix	3,748.8
		Sagebrush/Grass Mix	270.5
		Short-grass Prairie	13,817.1
		Shrub/Grass/Forb Mix	10.7
Riparian	644	Herbaceous Riparian	527.7
		Riparian	116.5
Water	286	Water	286.1
Other	471.5	Soil	471.5
Total Colorado Watershed Acres			**237,410**

WHITEWOMAN Kansas Land Use	Total Acreage	Vegetation	Acreage
Cropland	7,070,209	Fallow	53,037.0
		Pasture/Hayland	508,635.8
		Row Crops	2,099,725.3
		Small Grains	4,408,810.5
Rangeland/Grassland	7,571,977	Grasslands/Herbaceous	7,520,370.5
		Shrubland	51,606.9
Forest	14,735	Deciduous Forest	9,656.4
		Evergreen Forest	5,044.6
		Mixed Forest	33.6
Riparian	18,685	Emergent Herbaceous Wetlands	16,925.4
		Woody Wetlands	1,759.5
Water	8,418	Water	8,418.0
Other	78,261	Bare Rock/Sand/Clay	30,868.2
		Commercial/Industrial/Transportation	19,266.1
		High Entensity Residential	5,028.3
		Low Intensity Residential	18,134.2
		Quarries/Strip Mines/Gravel Pits	571.6
		Urban/Recreational Grasses	3,617.6
		Transitional	775.4
Total Kansas Watershed Acres			**14,762,285**



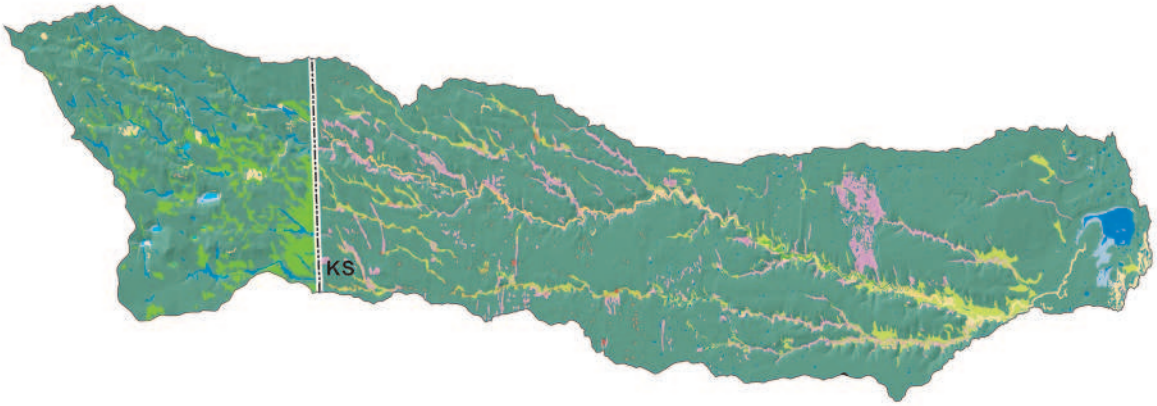
Precipitation in the White Woman watershed averages between 15 and 17 inches per year. Droughts are common in the watershed, as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. The first took place in the 1910s, and another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s, when a series of hot, dry summers following a period of scant mountain snowpack created water shortages. The fourth serious drought hit parts of Colorado in the late 1970s, and the most severe drought of the century occurred in 2002. Climatic records have been kept in Colorado since the late 1800s, and researchers look to tree ring data for clues to climatic conditions prior to the record. Tree ring data indicates historic occasions of acute drought in Colorado, with some lasting many years.

Rainfall in the watershed typically occurs as frontal storms in the early summer, and as high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn, and precipitation in winter is snow. The average annual temperature is from 37 to 66 degrees F. The frost free period averages 153 days but ranges from 106 to 184 days.



Ecological Sites — The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

Ecological Site maps give an overall indication of the soils plant relationship in the area. More detailed descriptions of ecological sites are provided in the Field Office Technical Guide (FOTG). The FOTG is available in local offices of the Natural Resources Conservation Service (NRCS) and online at http://www.nrcs.usda.gov/technical/efotg/.

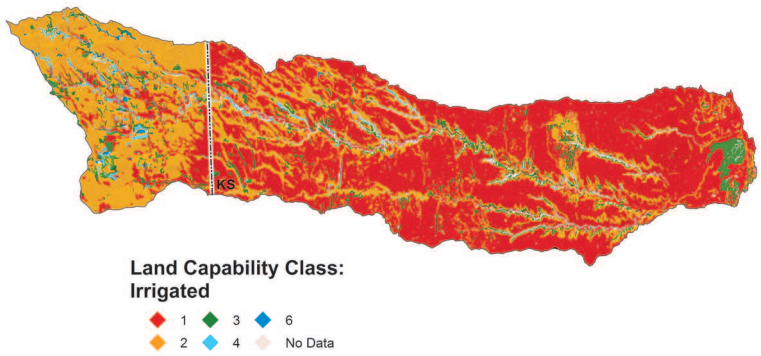


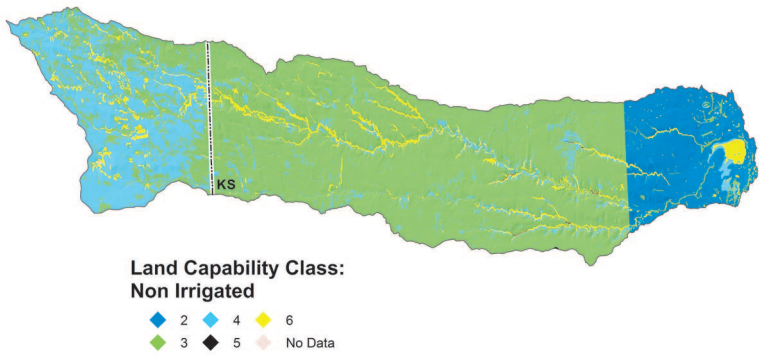
Soil: Ecological Site Name

- Alkaline Plains
- Choppy Sands
- Clay Upland
- Closed Upland Depression
- Gravel Breaks
- Loamy Lowland
- Loamy Terrace
- Loamy Upland
- Limy Upland
- Loamy
- Loamy Plains
- Loamy Slopes
- Overflow
- Plains Swale
- Saline Lowland
- Sandy Lowland
- Saline Overflow
- Sands
- Sandy
- Sandy Bottomland
- No Data

Land Capability Classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for wood land, and for engineering purposes.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.





Land Capability Classes

Class 1 - soils have few limitations that restrict their use.

Class 2 - soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 - soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 - soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 - soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

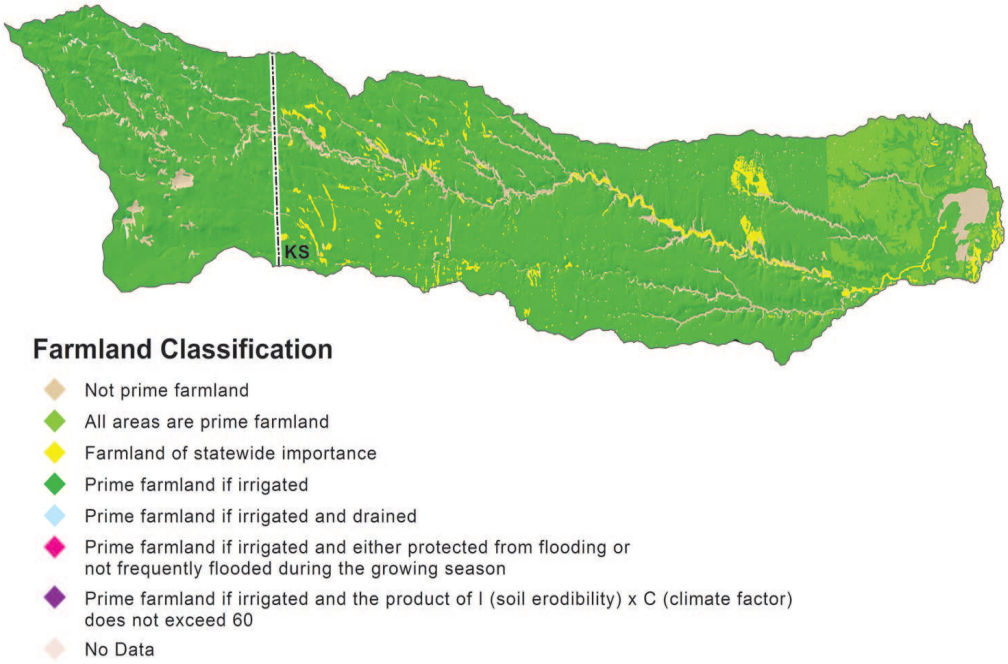
Class 7 - soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

Farmland Classification

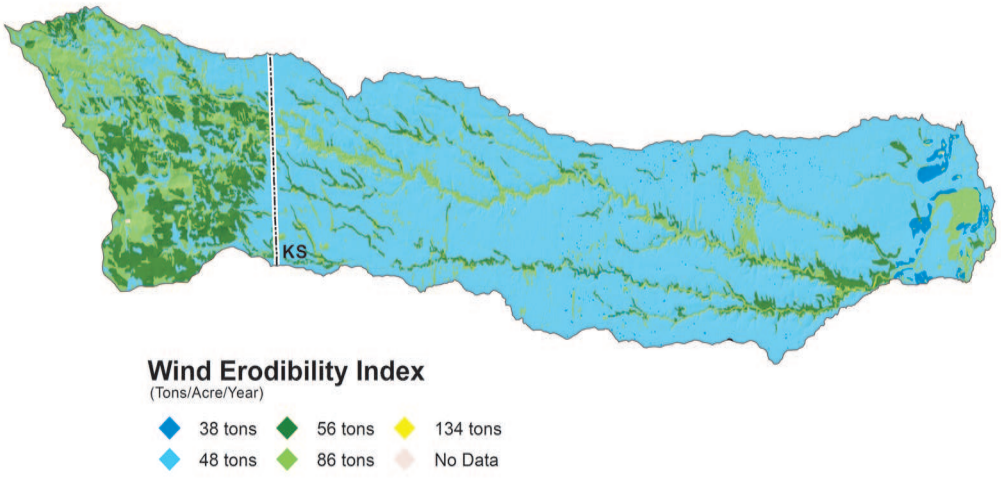
Prime farmland is land that has the best combination of physical characteristics for producing food, feed, forage, fiber and oil seed crops and is also available for these.

Colorado had approximately 1,696,800 acres of nonfederal prime farmland recorded in 1997. This represents over 2 percent of the states total land area or 4 percent of the nonfederal land in Colorado. Nationally. 64 percent of soils classified as prime farmland are being used for cropland. In Colorado, 93 percent of the soils classified as prime farmland are being utilized as cropland.



Wind Erodibility Index

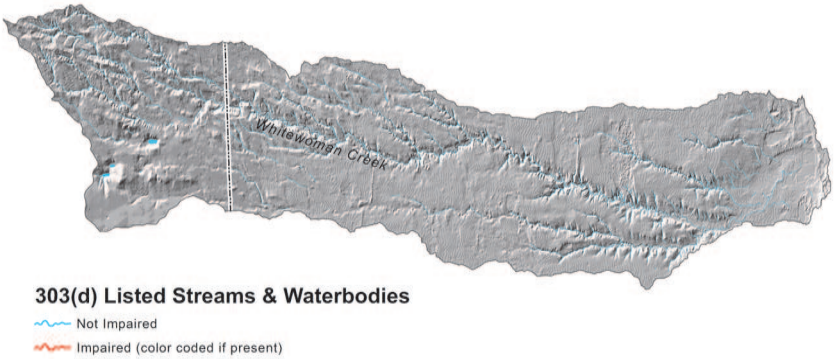
The Wind Erodibility Index (WEI), is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management. Soils with an erodibility index equal to or greater than 8 are considered highly erodible.



Surface Water Quality

Surface water quality in the White Woman Watershed is generally good. Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met for designated uses. As indicated in the map, there are no 303(d) listed streams in the watershed. The Smoky Hill Headwaters are designated as Primary Contact Recreation, Aquatic Life Warm I, and Agriculture.

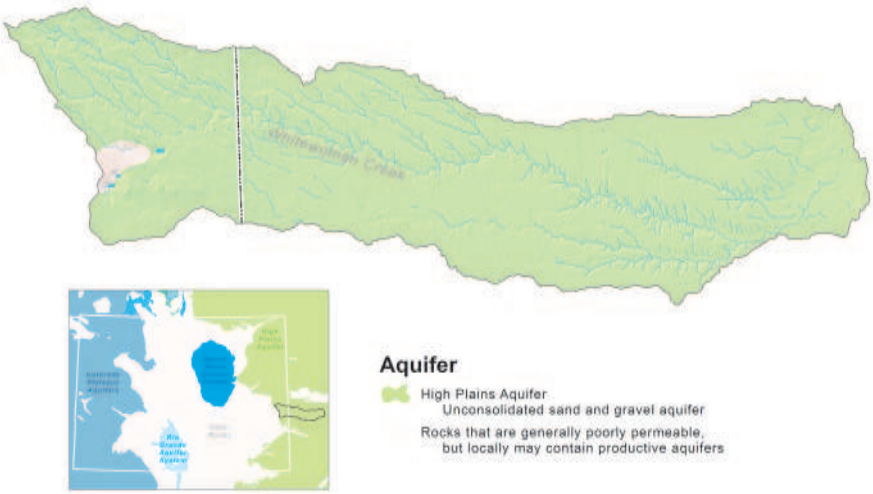
Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met. Thereafter, TMDLs compromising quantitative objectives and strategies have been or will be developed for these impaired waters within the watershed in order to achieve their water quality standards. Updates to the 303d/TMDL list can be found at: http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303dtmdlpro.html



Ground Water

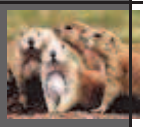
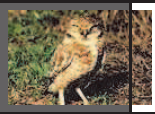
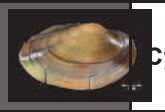
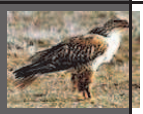
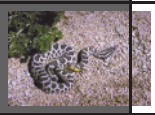
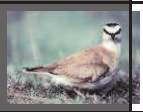
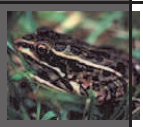
The High Plains Aquifer underlies the White Woman watershed, and is the primary source of irrigation and domestic water for the area. The High Plains aquifer is an extensive regional aquifer that underlies the Great Plains states extending from South Dakota on the north to Texas and New Mexico on the south.

Ground water quality is generally good. Total dissolved solids in the aquifer have risen significantly since the early 1900s, and in some areas, the water may exceed drinking water standards for sulfate, chloride, fluoride, iron and arsenic. These concentrations may be naturally derived from geologic sources.



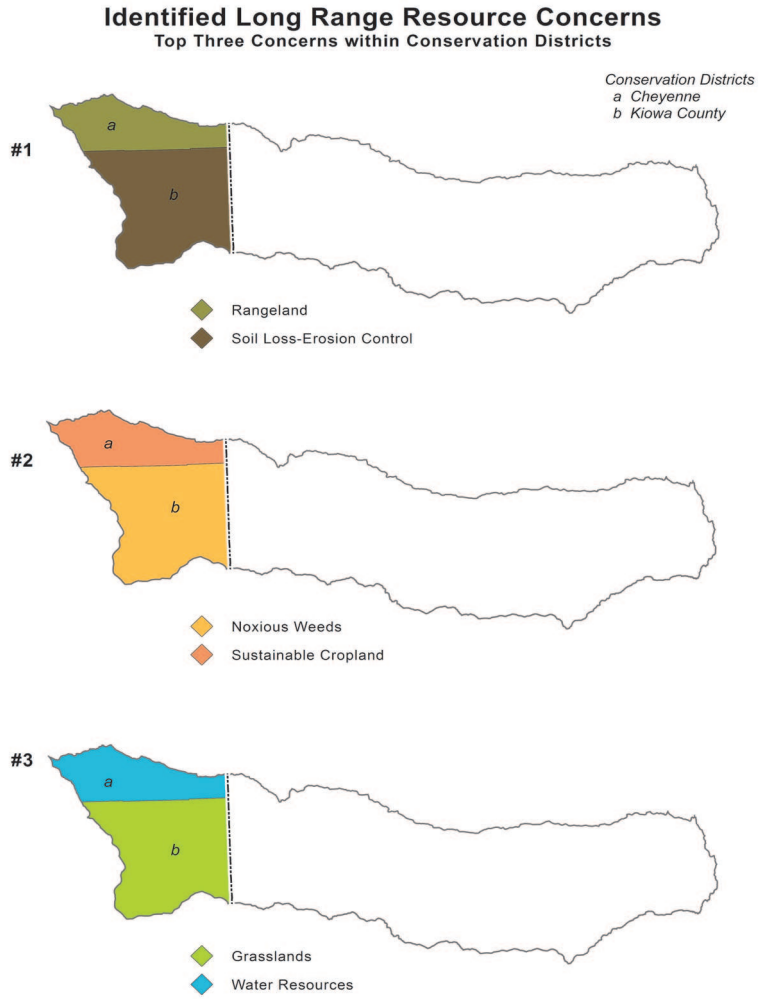
Threatened & Endangered Species

State & Federally Threatened, Endangered & Candidate Species as well as Species of Special Concern in Whitewoman Watershed

	Common Name	Scientific Name	Class	Federal Status	State Status	Comments
	**Arkansas Darter**	*Etheostoma cragini*	Fish	Candidate	Threatened	May occur in the watershed
	**Bald Eagle**	*Haliaeetus leucocephalus*	Birds	None	Threatened	May migrate through watershed
	**Black-footed Ferret**	*Mustela nigripes*	Mammals	Endangered	Endangered	No current records of occurrence
	**Black-tailed Prairie Dog**	*Cynomys ludovicianus*	Mammals	Candidate	Concern	Occurs in the watershed
	**Burrowing Owl**	*Athene cunicularia*	Birds	None	Threatened	Occurs in the watershed
	**Cylindrical papershell**	*Anodontoides ferussacianus*	Gastropods	None	Concern	May occur in the watershed
	**Ferruginous Hawk**	*Buteo regalis*	Birds	None	Concern	Occurs in the watershed
	**Long-Billed Curlew**	*Numenius americanus*	Birds	None	Concern	May occur in the watershed
	**Massasauga**	*Sistrurus catenatus*	Reptiles	None	Concern	May occur in the watershed
	**Mountain Plover**	*Charadrius montanus*	Birds	None	Concern	May occur in the watershed
	**Northern leopard frog**	*Rana pipiens*	Amphibians	None	Concern	May occur in the watershed
	**Plains Leopard Frog**	*Rana blairi*	Amphibians	None	Concern	Occurs in the watershed
	**Swift fox**	*Vulpes velox*	Mammals	None	Concern	Occurs in the watershed
	**Yellow mud turtle**	*Kinosternon flavescens*	Reptiles	None	Concern	May occur in the watershed

Social Data

	Cheyenne	Logan
Demographics (US Census, American Factfinder)		
Total population	2,231	
Male	1,119	
Female	1,112	
Median age (years)	37.9	
White	2,072	
Black or African American	11	
American Indian and Alaska Native	17	
Asian	3	
Native Hawaiian and Other Pacific Islander	0	
Some other race	114	
Hispanic or Latino (of any race)	181	
Economic Characteristics (US Census, American Factfinder)		
In labor force (population 16 years and over)	1,066	
Median household income (dollars)	37,054	
Median family income (dollars)	44,394	
Per capita income (dollars)	17,850	
Families below poverty level	53	
Individuals below poverty level	244	
X means that value is not applicale or not availiable		
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)		
Farms (number)	283	930
Land in farms/ranches (acres)	740,486	1,111,135
Average size farm/ranch (acres)	2,617	1,195
Median size farm (acres)	1,528	608
Average age of farmer or rancher	57.2	52.8
Net cash return from ag sales ($1,000)	1,829	5,092
Cattle and calves (number)	20,000	185,000



Resource Concerns Identified by Conservation Districts

Resource Concern By Priority	Cheyenne	Kiowa	Total
Rangeland/Grazingland Health	5		5
Funding		5	5
Sustainable Cropland	4		4
Erosion	4		4
Small acreage management	4		4
Water Quality/Quantity		3	3
Invasive Weeds	2		2
Flood Control		2	2
Trees	1		1

Notes:

The Conservation Districts identified and prioritized these resource concerns during facilitated public meetings held between 1998 and 2000 and are part of the Conservation District's Long Range Plans.

Selected Conservation Application Data White Woman 11030002				
	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	1,144	4,285	2,048	7,477
Total Conservation Systems Applied (Acres)	3,000	1,432	3,932	8364
Practices				
Prescribed Grazing	2,099	na	825	2924
Upland Wildlife Habitat Management	483	na	169	652
Conservation Cropping System	na	639	777	1416
Residue Management	140	396	160	696

Conservation Systems to Address Major Resource Concerns

Primary Resource Concern:	**Rangeland Health**			
Conservation System Description:	Prescribed Grazing—planned management that provides adequate recovery opportunity between grazing events and proper stocking of animals. Estimate 64,000 acres need to be treated on medium sized ranches of 3,500 acres.			**Based on Conservation System Guide Code:** CO 67B.1-GR-01-R-Grazing
Practices	**Unit**	**Quantity**	**Cost/Unit ($)**	**Estimated Cost ($)**
Prescribed Grazing:				
Fence (382)	Ft.	22,000	0.6	13,200
Pest Management (595)	Ac.	500	5.0	2,500
Pipeline (516)	Ft.	10,000	2.40	24,000
Upland Wildlife Habitat Management (645)	Ac.	500	na	0
Watering Facility (614)	No.	4	410	1,640
Windbreak/Shelterbelt Establishment (380)	Ft.	3,000	.85	2,550
Costs to apply prescribed grazing per median sized ranch of 3,500 acres	No.	18	43,890	
Subtotal: Rangeland costs				**$790,020**

Conservation Systems to Address Major Resource Concerns (cont'd)

Primary Resource Concern:	**Soil Erosion By Wind on dryland crops**	
Conservation System Description:	Seasonal residue management with Conservation crop rotation, Nutrient and Pest Mgt	**Reference Conservation System Guide Code:** CO 67B.1-CR-Dryland-R-2

Practices	Unit	Quantity	Cost/Unit ($)	Estimated Cost ($)
Conservation Crop Rotation (328)	Ac	60,000	5	300,000
Residue Mgmt, Seasonal (344)	Ac	50,000	5	250,000
Nutrient Management (590)	Ac	20,000	5	100,000
Pest Management (595)	Ac	20,000	15	300,000
			Subtotal Costs Dryland Crops:	**$950,000**

General Effects, Impacts, and Estimated Costs of Application of Conservation Systems

Landuse	Resource Concern	Measurable Effects	Non-measurable Effects	Estimated Cost ($)
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage, and shelter. Wildlife habitat is sustained or improved.	**$790,020**
Dryland Crop	Soil	240,000 Total Tons/Year saved	Cropland sustainability	**$950,000**
			Estimated Total Costs to Address Major Resource Concerns:	**$1,740,020**

FOOTNOTES/ BIBLIOGRAPHY

Threatened and Endangered Species information was gathered using data from the Colorado Division of Wildlife (CDOW) Natural Diversity Information Source (NDIS). NDIS GIS data may be downloaded at http://ndis.nrel.colostate.edu. For more information on Colorado's Endangered & Threatened Species, as well as Species of Concern, visit http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ThreatenedEndangeredList/ListOfThreatenedAndEndangeredSpecies.htm or http://mountainprairie.fws.gov/endspp/CountyLists/COLORADO.htm

Resource Concerns were identified using the Colorado Association of Conservation Districts' (CACD) long range (10 year) plans from the period of 1996-2000. Only the top three environmental resource concerns for each district were used. For more information on Colorado's Conservation Districts, visit http://www.cacd.us.

Maps were generated using Soil Survey Geographic Database (SSURGO) tabular and spatial data. SSURGO data was downloaded for the following Colorado and Kansas surveys:

Cheyenne County Area (CO017) Published 12/19/2005

Kiowa County Area (CO061) Published 12/19/2005

Greeley County Area (KS071) Published 02/08/2006

Scott County Area (KS171) Published 12/21/2006

Wichita County Area (KS203) Published 12/23/2006

To download SSURGO data, visit http://soildatamart.nrcs.usda.gov. The surveys were then loaded into Soil Data Viewer http://soildataviewer.nrcs.usda.gov (a tool built as an extension to ArcMAP for quick geospatial analysis of soil data for use in resource assessment) and the subsequent data was exported to a shapefile.

Vegetation data was generated using the Colorado Division of Wildlife's "Colorado Vegetation Classification Project" (CVCP) data. Completed in 2003, the CVCP is a landscape level vegetation dataset created using Landsat TM imagery and then formatted for GIS use. The species identified are an overview of the most common species associated in each cover type, in order of greatest occurrence. For more information on the Colorado Vegetation Classification Project, visit http://ndis.nrel.colostate.edu/coveg.

Common Resource Area (CRA), a subdivision of the Major Land Resource Area (MLRA), is a geographical area where resource concerns, problems, or treatment needs are similar. Geographic boundaries of a CRA are determined by landscape conditions, soil, climate, human considerations and other natural resource information. For more information on Common Resource Areas visit http://soils.usda.gov/survey/geography/cra.html.

Average Annual Precipitation data was developed through a partnership between the Natural Resources Conservation Service's (NRCS) National Water and Climate Center (NWCC), the National Cartography and Geospatial Center (NCGC), and the PRISM (the Parameter-elevation Regressions on Independent Slopes Model) group at Oregon State University (OSU), developers of PRISM. Mean annual precipitation maps were developed calculating averages of rainfall for the period of 1961-1990. For more information on PRISM data visit http://www.ncgc.nrcs.usda.gov/products/datasets/climate/docs/fact-sheet.html or for more information about technical aspects of PRISM, visit the PRISM website at http://www.ocs.orst.edu/prism.

Land Ownership (status,12/31/2006 dataset) data was obtained from the Colorado Department of Transportation (CDOT). For more information, visit http://www.dot.state.co.us.

Relief & Elevation maps were created using the National Elevation Dataset (NED), 30m Digital Elevation Model (DEM) raster product assembled by the U.S. Geological Survey (USGS). A hillshade grid was created from the 30m DEM to create a 3D effect. For more information about the NED visit http://ned.usgs.gov. The data was downloaded from the NRCS Geospatial Data Gateway at http://datagateway.nrcs.usda.gov.